Protocol Development Summary

Protocol: Distribution and abundance of high-priority invasive plant species

Parks Where Protocol will be Implemented: FOCL, MORA, NOCA, OLYM

Justification/Issues being addressed: Invasive plant species can disrupt ecosystem processes, preempt habitat for rare plants and other native plant species, eliminate food and habitat for native animals, create health and safety hazards, and damage cultural resources. Noxious weeds and other invasive plant species occur in all of the parks of the North Coast and Cascades Network. The proposed monitoring program will help direct and assess effectiveness of efforts to control invasive plants (e.g., the Exotic Plant Management Team), and identify newly emerging threats.

Specific Monitoring Questions and Objectives to be Addressed by the Protocol:
1) What is the distribution and abundance of high-priority invasive plant species in potential habitat at each park?
2) Which invasive plant species are emerging as potential threats to park ecosystems and where are they located?

Specific objectives of the protocol are:
1) Track changes in distribution and abundance of high-priority invasive plant species in areas identified as highly susceptible to establishment of those species (i.e. potential habitat). Distribution and abundance will be monitored every five years.
2) Detect incipient populations (i.e. small and localized) and new introductions of selected invasive plant species in potential habitat and track changes in cover of these populations.

Basic Approach: To accomplish the first objective, we will develop initial lists of the invasive exotic plants for each park that pose the greatest threat to natural and cultural resources. We expect to include on average eight invasive plant species per park. For each of these species, we will summarize existing information on distribution within the park, and other ecological data, to identify the set of potential habitat locations (including all known locations in the park). The collective list of potential habitat locations for all high-priority invasive plant species will constitute the population of monitoring sites for each park. Sites will be selected in a stratified-random manner from these populations of sites at each park, based on both accessibility and major habitat differences (e.g., road corridors vs. undisturbed forest). We will measure a total of 50 locations at FOCL and 250 locations in each of the 3 larger parks. At each location we will record the extent, number of stems, and cover of the target invasive species, plus the cover of all other vascular plant species present. The data will be summarized by species and park into the following indicators: proportion of sites occupied; mean spatial extent of populations; mean number of individuals per population; mean cover of the target species; mean cover of all invasive species; and mean cover of all native species. We will also obtain data on

control efforts by the Exotic Plant Management Team and other NPS personnel to use as a covariate in analyses of invasive species trends.

The proposed design results in 800 sampling locations across the network. We anticipate that working together, two people could average three locations per day. In a 12-week season, a four-person crew could then measure 288 locations, allowing for one office day per week. Although it would be optimal to visit all locations annually, we feel that it is more realistic to plan on one four-person crew. Thus we propose a five-year cycle, with one of the four parks each year, and no measurements one year out of five.

To accomplish the second objective, we will collate data from other monitoring modules that include vegetation (e.g., song-birds, riparian vegetation/aquatic habitat) and opportunistic observations such as backcountry logs. We will use these data to identify any invasive plant species that are either newly appearing in a park, or undergoing range expansion. We will also analyze observations of high-priority species to assess whether our descriptions of potential habitat for those species remain valid.

Principal Investigators and NPS Lead: The NPS leads will be Steve Acker, Mignonne Bivin, and Laurie Kurth. The PIs are to be determined.

Development Schedule, Budget, and Expected Interim Products:
The current activity is to develop a method for identifying potential habitat locations, using Olympic National Park as an example. The work will be accomplished through a CESU agreement with University of Washington. This will be a two-year project, at a total cost of $63,000. The project will produce distribution summaries for high-priority invasive species that are essentially restricted to particular habitat features (disturbed areas, shorelines), and models of potential distribution for species that occur in a variety of habitats including undisturbed forests.

In addition to establishing a method for generating a sampling scheme from the predicted distribution of high-priority invasive plant species, we will also need to develop the protocol for measurements at each sampling location. This work could proceed simultaneously with the work on spatial distribution of the high-priority species. We assume that this step will require the equivalent of one year of full-time work for a research scientist (at the post-doctoral level), and at least one field season for a crew of two. If so, the budget for this step would be as follows:

Research scientist ($40,000/yr, 25% benefits)	$50,000
Travel and supplies for scientist	1,000
CESU overhead on $51,000 at 17.5%	8,925
Crew leader, 1 @ GS7, 8 pay periods	10,976
Crew member, 1 @ GS5, 6 pay periods	6,641
GIS support, 1 @ GS9-3, 2 pay periods	4,575
Supplies and equipment for field crew	1,000
GSA vehicle (minivan, 4 months, 4000 miles)	1,336
Travel (20 days at standard rate, entire crew)	3,320

Total $87,773

When the protocol is implemented, staffing will include a crew of four (including a crew leader). Permanent staff from the network parks will perform GIS support, data analysis and reporting (we assume that costs of support from data management staff will be covered in the network budget). The breakdown of the annual budget is as follows:

Crew leader, 1 @ GS7, 8 pay periods $11,732
Crew members, 3 @ GS5, 6 pay periods   20,818
Supplies and equipment   2,000
GSA vehicle   3,000
Travel (20 days, entire crew)   4,800

Total $42,350

This is the cost of each year of measurement at the large parks. In order to help balance the network budget, we reduced the planned level of effort and funding to 60% of this amount for each of the large parks. We maintained the same level of effort for FOCL. We assumed each measurement year at FOCL would require 25% of the above total, so the average annual total budget over a five-year cycle is the above total times $((3 * 0.6) + 0.25)/5$, or $17,363.